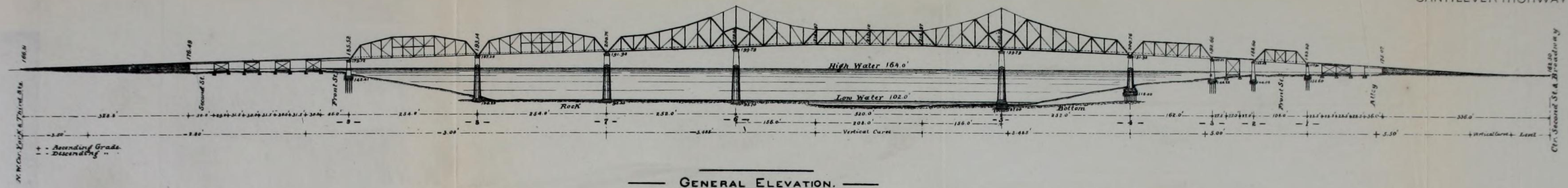
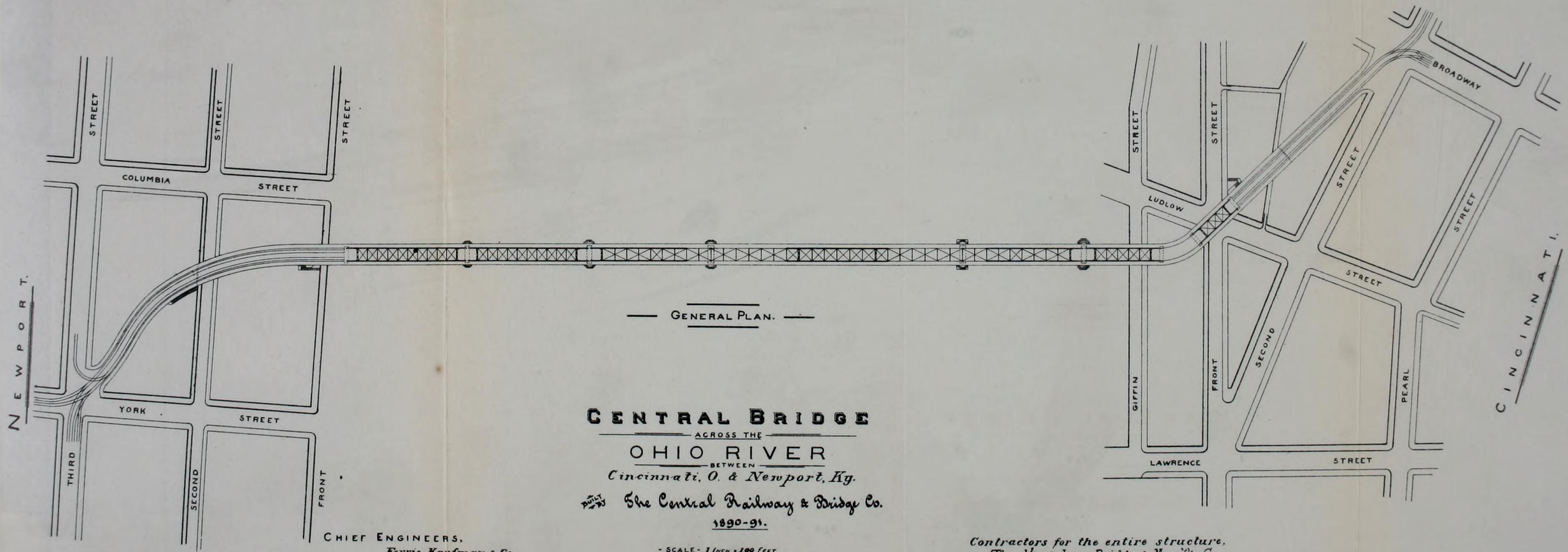
PLATE XXVII.
TRANS. AM. SOC. CIV. ENGRS.
VOL. XXVII. No. 545.
KAUFMAN AND OSBORN ON
CANTILEVER HIGHWAY BRIDGE.



GENERAL ELEVATION.



GENERAL PLAN.

CENTRAL BRIDGE

ACROSS THE

OHIO RIVER

BETWEEN

Cincinnati, O. & Newport, Ky.

Built by The Central Railway & Bridge Co.

1890-91.

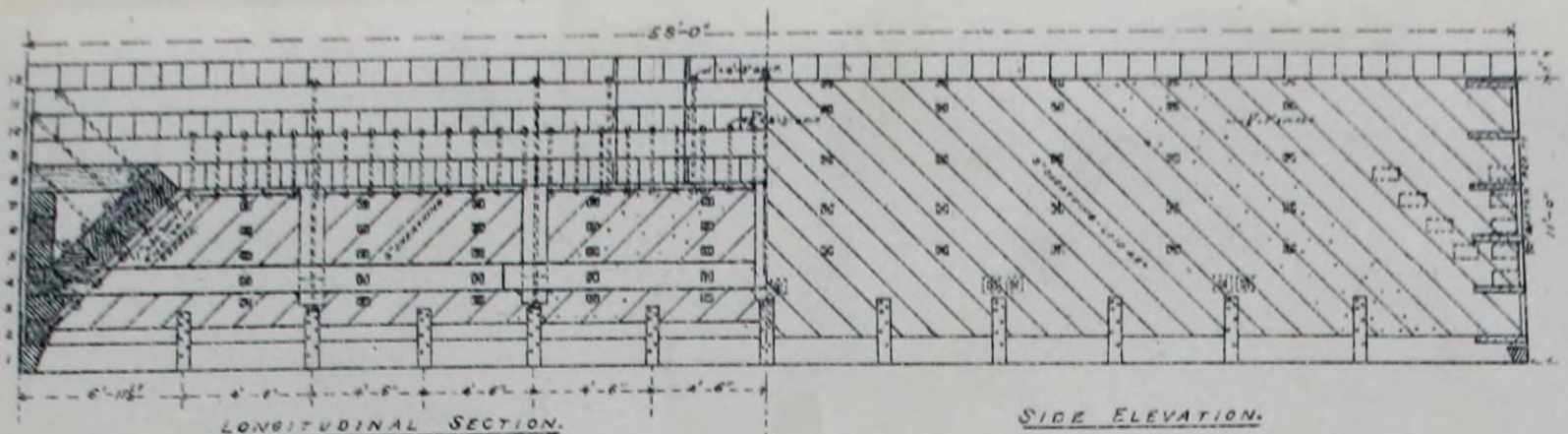
SCALE - 1 INCH = 100 FEET.

CHIEF ENGINEERS,
Ferris, Kaufman & Co.,
OF PITTSBURGH, - PA.

RESIDENT ENGINEER,
A. A. Stuart.

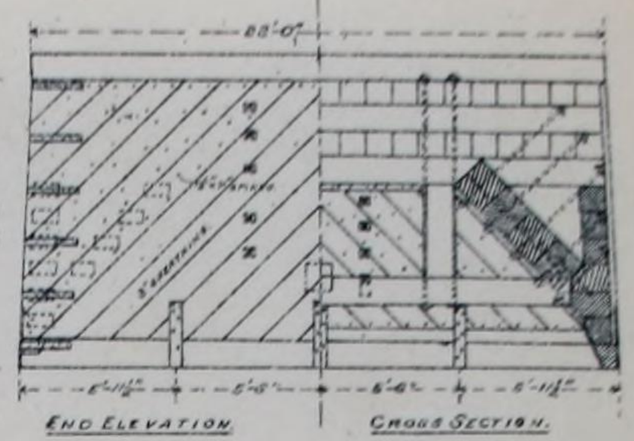
Contractors for the entire structure.
The King Iron Bridge & Manf'g Co.,
OF CLEVELAND, - O.


Hydrograph of the Ohio River
at Cincinnati, O. 1890-91
during construction of
Central Bridge
A. A. STUART
Resident Engineer
FERRIS, KAUFMAN & CO.
Chief Engineers
PITTSBURGH
PA.
Average Temperature
Taken
- 8 A.M. & 5 P.M. -
Note: Stage of River corresponds to Water Works Gauge
at 6 A.M.
January
February
March
April
May
June
July
August
September
October
November
December



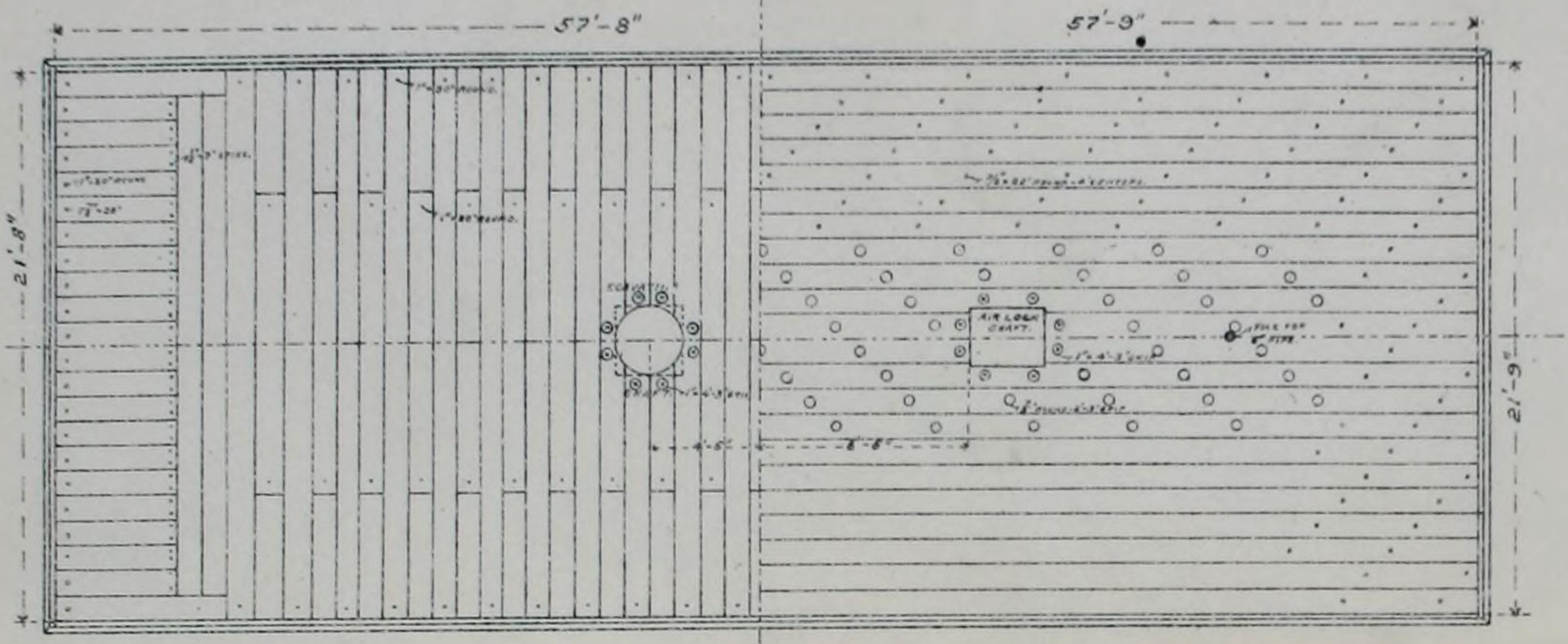
LONGITUDINAL SECTION.

SIDE ELEVATION.



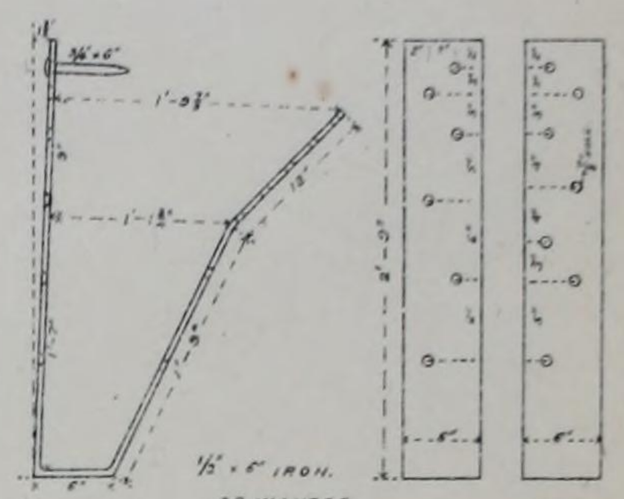
END ELEVATION

CROSS SECTION.

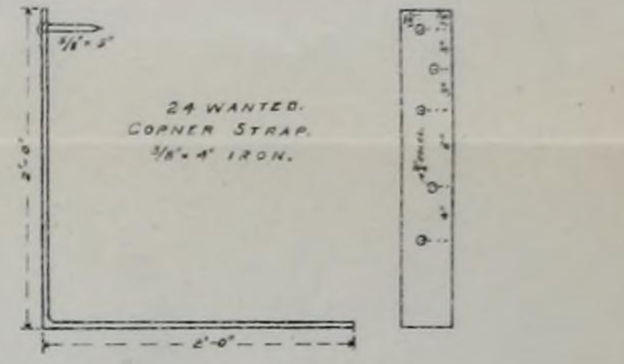


PLAN COURSE 2.

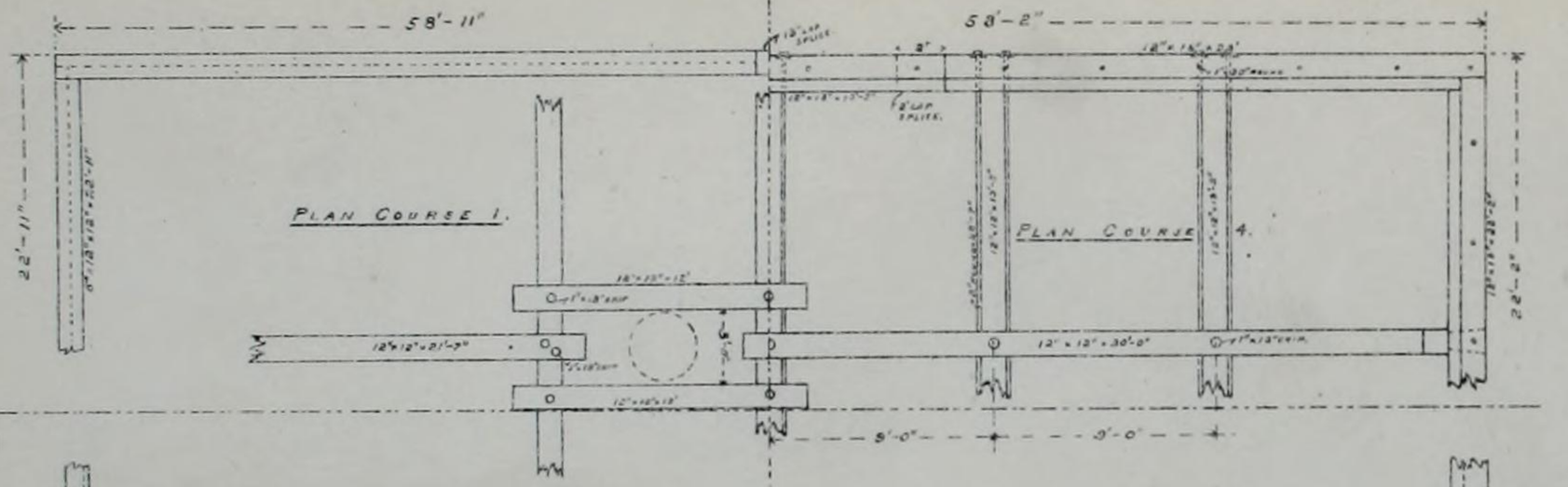
PLAN COURSE 3.



½" x 6" IRON.
28 WANTED.
SHOE STRAP.

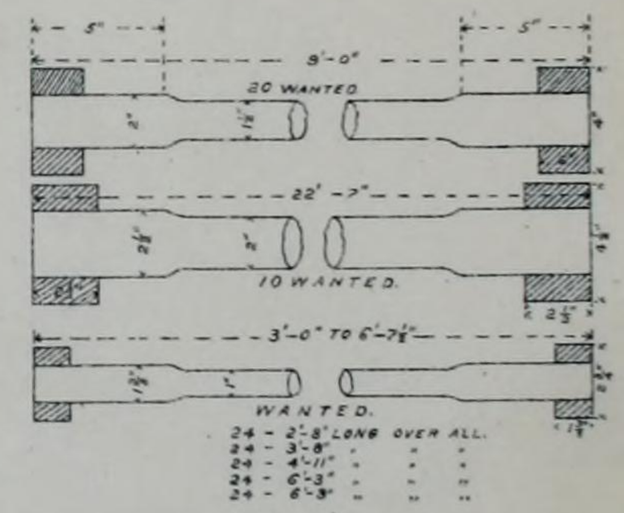


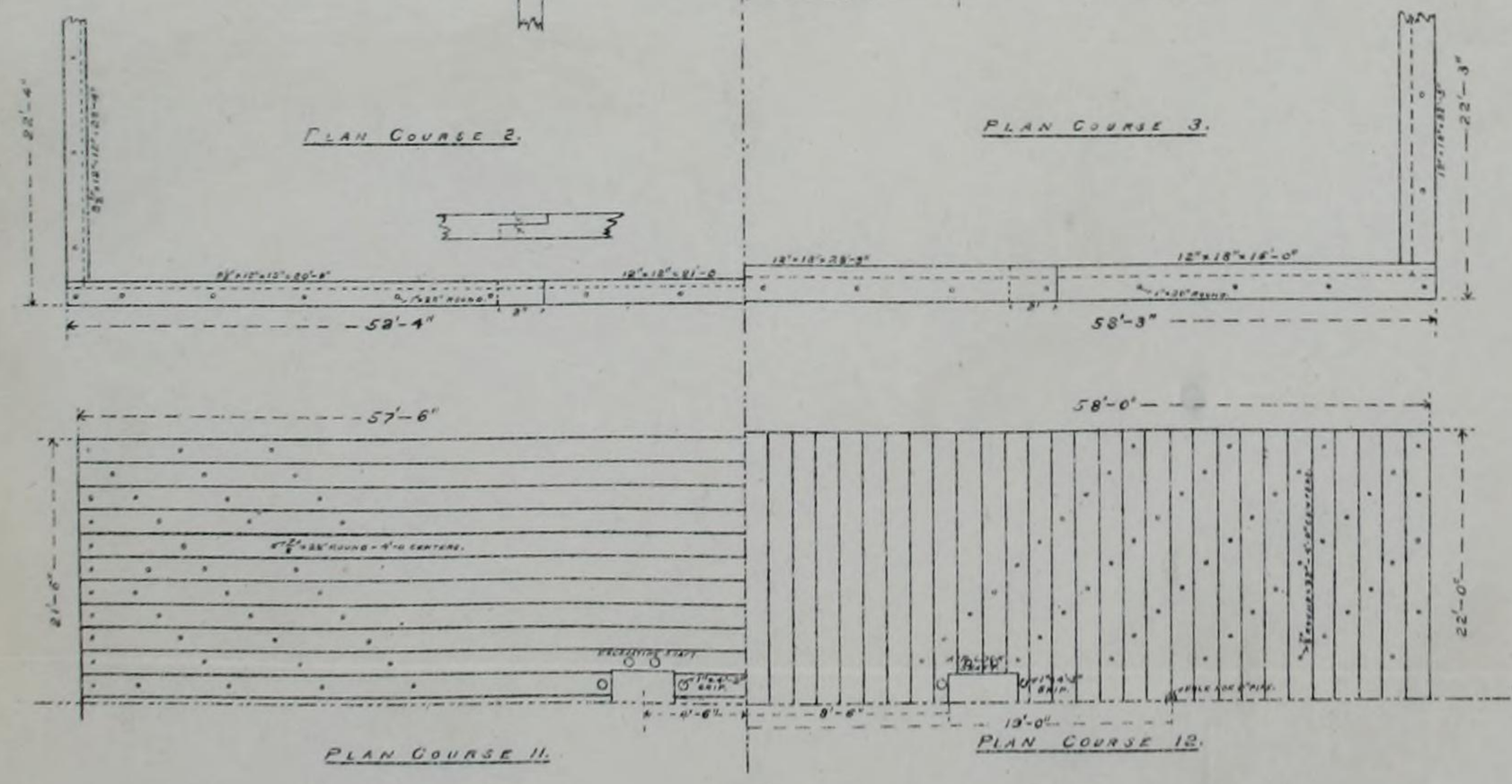
24 WANTED.
CORNER STRAP.
3/8" x 4" IRON.



PLAN COURSE 1.

PLAN COURSE 4.



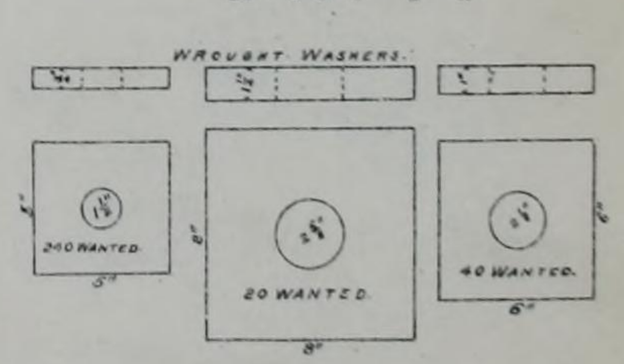


PLAN COURSE 2.

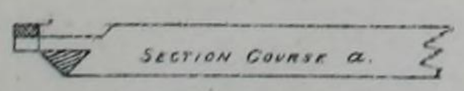
PLAN COURSE 3.

PLAN COURSE 11.

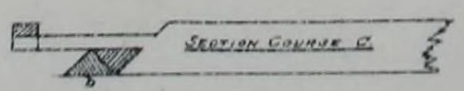
PLAN COURSE 12.



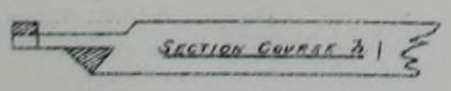
CENTRAL RAILWAY & BRIDGE Co.
PLAN OF CAISSON FOR PIER No. 5.
SCALE, ½" = 1 FT.
SEPT. 20TH 1920.



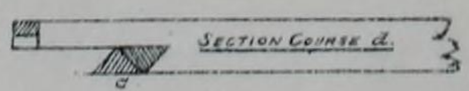
SECTION COURSE a.



SECTION COURSE c.

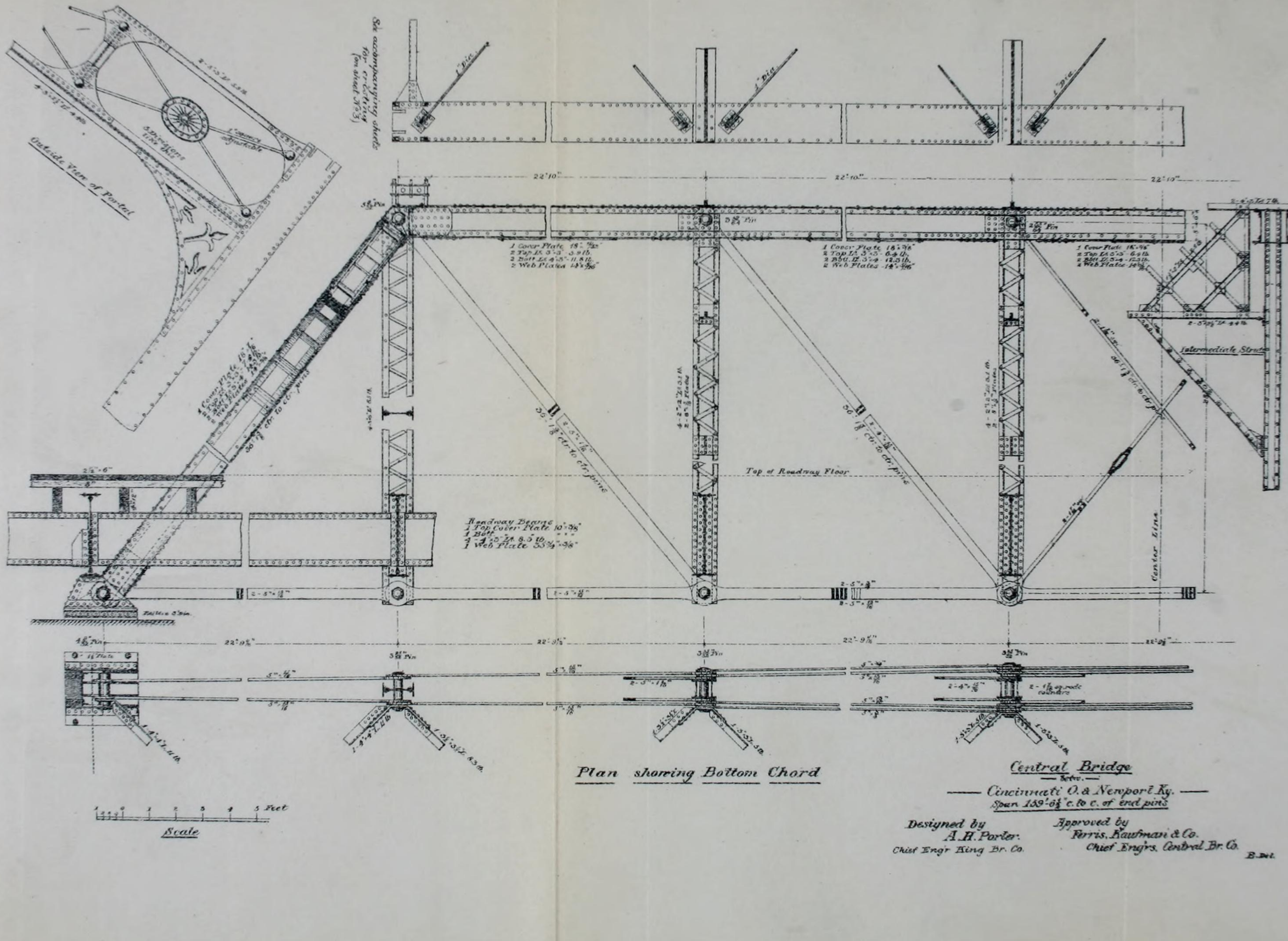


SECTION COURSE b.



SECTION COURSE d.

PLATE XXX.
TRANS. AM. SOC. CIV. ENGRS.
VOL. XXVII. No. 545.
KAUFMAN AND OSBORN ON
CANTILEVER HIGHWAY BRIDGE.



Central Bridge

— Ref. —

— Cincinnati O. & Newport Ky. —

Span 159'-6½" c. to c. of end pins

Designed by
A. H. Porter.
Chief Engr. King Br. Co.

Approved by
Ferris, Kaufman & Co.
Chief Engrs. Central Br. Co.

B. Del.

PLATE XXXIII.
TRANS. AM. SOC. CIV. ENGRS.
VOL. XXVII. No. 545.
KAUFMAN AND OSBORN ON
CANTILEVER HIGHWAY BRIDGE.

Central Bridge
— between —
Cincinnati O. and Newport Ky.

Designed by
A. H. Porter
Chief Engr. King Br. Co.

Approved by
Ferris, Kaufman & Co.
Engineers
Central Bridge Co.

— Notes. —
Span 250'6" c to c end pins
12 panels @ 20'-10½" (bottom)
Trusses 25'-11" ctr. to ctr.
2 Spans like this.

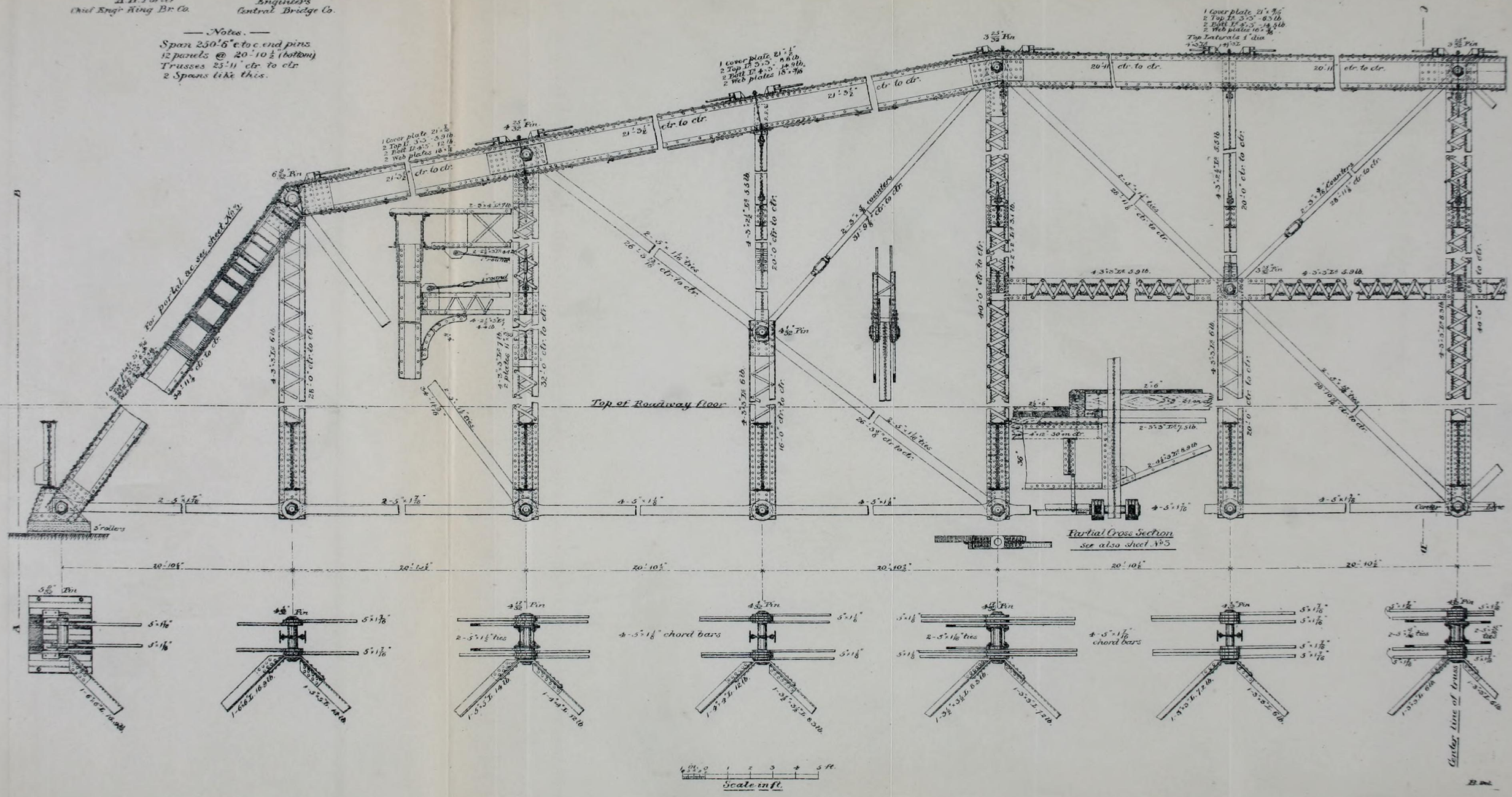
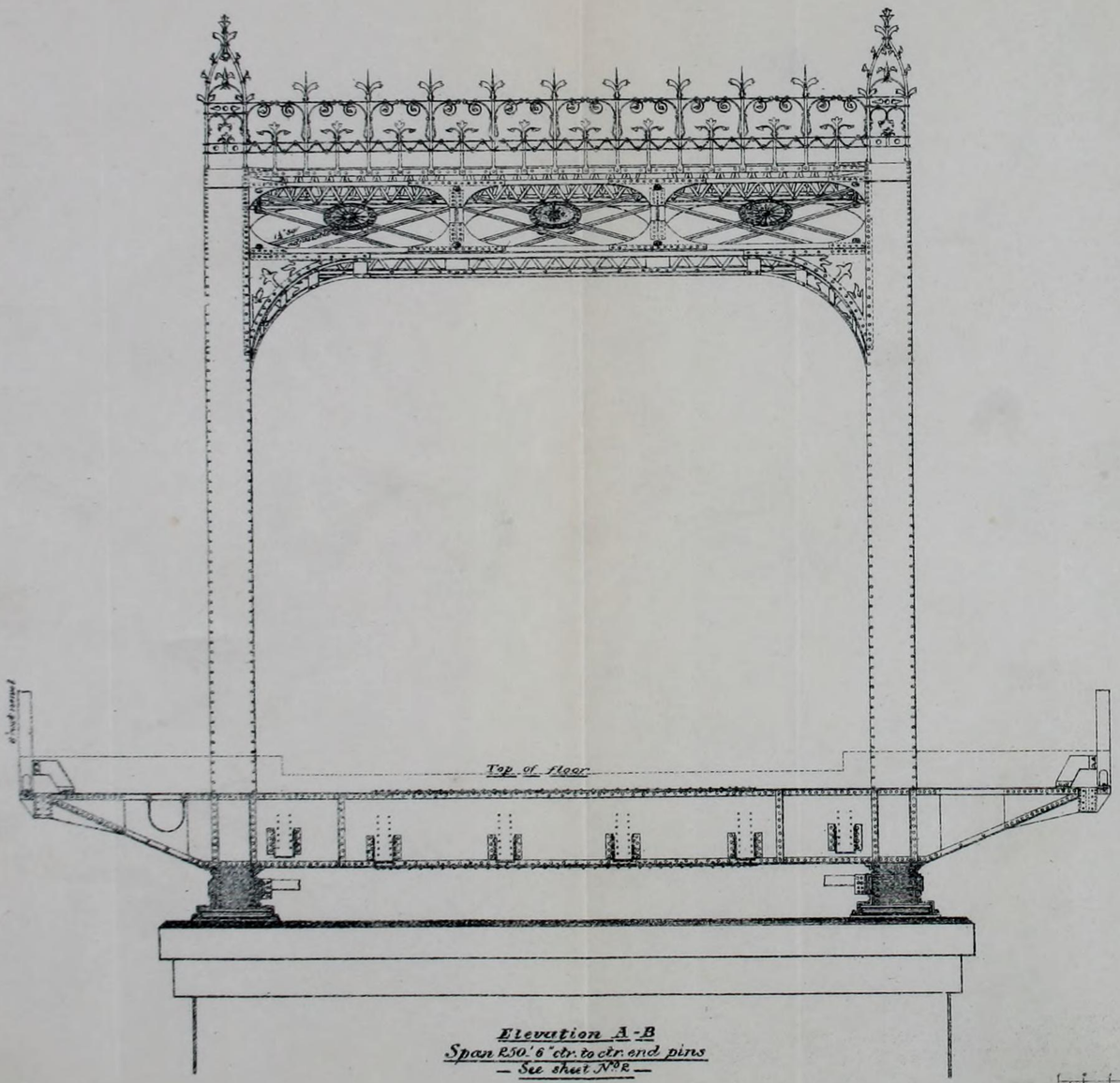


PLATE XXXIV
TRANS. AM. SOC. CIV. ENGRS.
VOL. XXVII. No 545.
KAUFMAN AND OSBORN ON
CANTILEVER HIGHWAY BRIDGE.

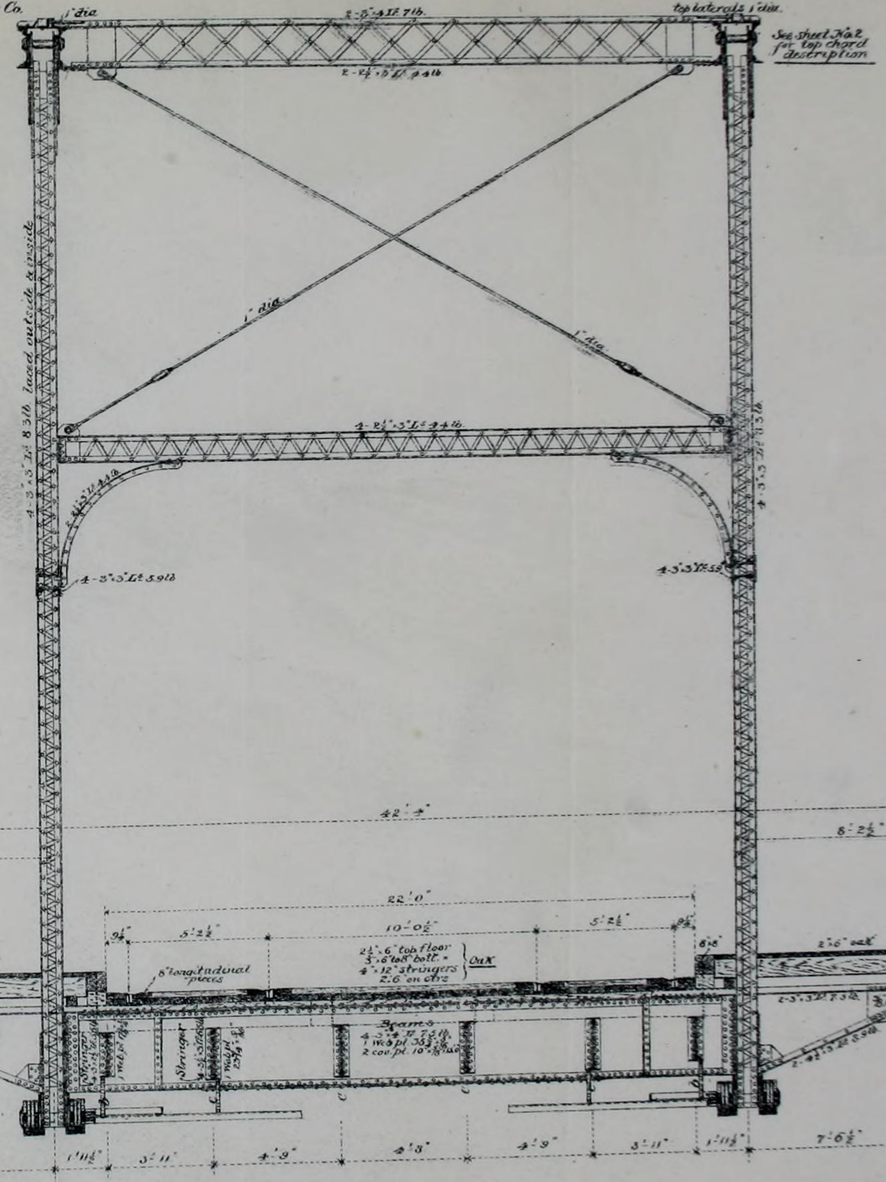
Central Bridge
— between —
Cincinnati O. and Newport Ky.

Designed by
A. H. Porter
Chief Engr King Br. Co.

Approved by
Ferris, Kaufman & Co.
Engineers Central Br. Co.



Elevation A-B
Span 250'6" ctr. to ctr. end pins
— See sheet No 2 —



Cross Section C-D
Span 250'6" ctr. to ctr. end pins
— See sheet No 2. —

Scale

PLATE XXXV.
TRANS. AM. SOC. CIV. ENGRS.
VOL. XXVII. No. 545.
KAUFMAN AND OSBORN ON
CANTILEVER HIGHWAY BRIDGE.

KING IRON BRIDGE & M'F'G. CO.
BUILDERS, CLEVELAND, O.

Strain Sheet

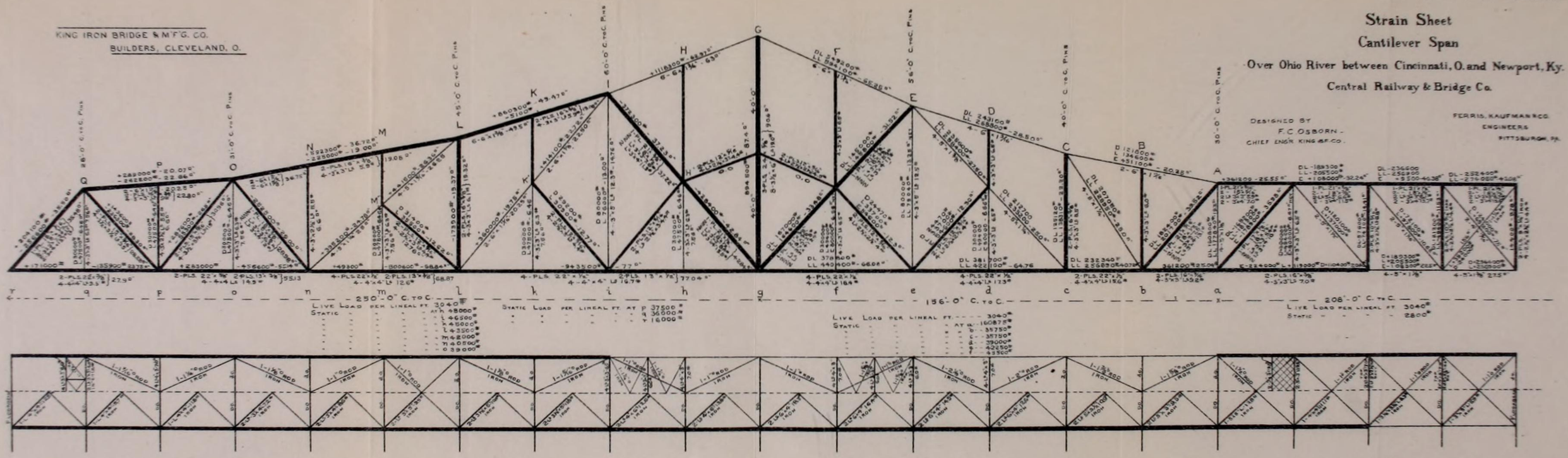
Cantilever Span

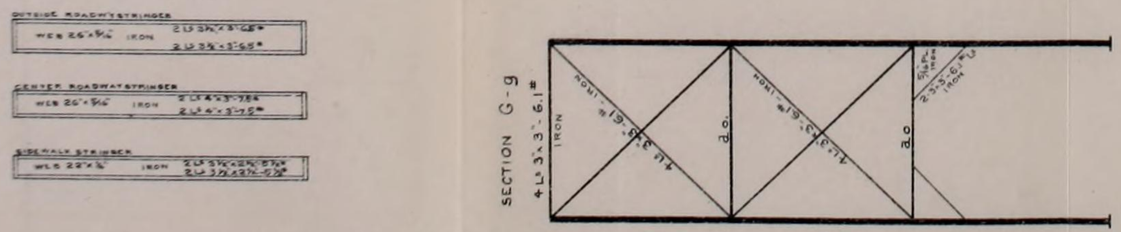
Over Ohio River between Cincinnati, O. and Newport, Ky.

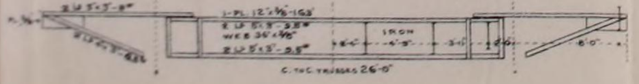
Central Railway & Bridge Co.

DESIGNED BY
F. C. OSBORN -
CHIEF ENGR. KING BR. CO.

FERRIS, KAUFMAN & CO.
ENGINEERS
PITTSBURGH, PA.







ALL MATERIAL STEEL EXCEPT WHERE OTHERWISE MARKED.

LIVE LOAD - For all truss members receiving more than one panel load, eighty (80) pounds per square foot for suspended span and cantilever arms. For stringers, floorbeams, and long suspenders one hundred (100) pounds per square foot of clear roadway and sidewalks, or an Aveling and Porter fifteen ton steam road roller.

In the calculation of stresses the following conditions of live load will be assumed.

For main truss members, the roadway and both sidewalks will be considered loaded.

For long suspenders, roadway and one sidewalk only will be considered loaded, and for floorbeams, the roadway will be considered loaded with sidewalks unloaded, also roadway unloaded with sidewalks loaded.

The above 80 pounds per square foot is taken on clear roadway and sidewalks.

WIND LOAD - Stresses calculated for a pressure of thirty (30) pounds per square foot on the exposed surfaces of both trusses and railings and a moving load surface of six (6) feet per lineal foot of bridge.

LATERAL STRUTS - Lateral struts will be proportioned to resist the resultant due to an initial stress of ten thousand (10,000) pounds per square inch upon all rods attached to them, when this is in excess of wind stress. The fiber stress due to weight of strut must be considered and be deducted from the unit stress specified.

Approved:
Ferris Kaufman & Co
By [illegible]
May 31, 1890.

ALLOWED STRAINS PER SQ. INCH.

TRUSSES

	Iron	Steel
Tension Members		
Eyebars and Counters	10000 (1- [illegible])	12000 (1- [illegible])
Shapes and Built Members	10000	12000
Lateral Rods	18000	
Compression Members		
Square Ends	9000 - 30 l/r	18000 - 60 l/r
One Square and One Pin End	9000 - 35 l/r	15000 - 70 l/r
Pin Ends	9000 - 40 l/r	15000 - 80 l/r
Lateral Struts	11000 - 30 l/r	

In which l = distance between supports in inches
r = least radius of gyration in inches

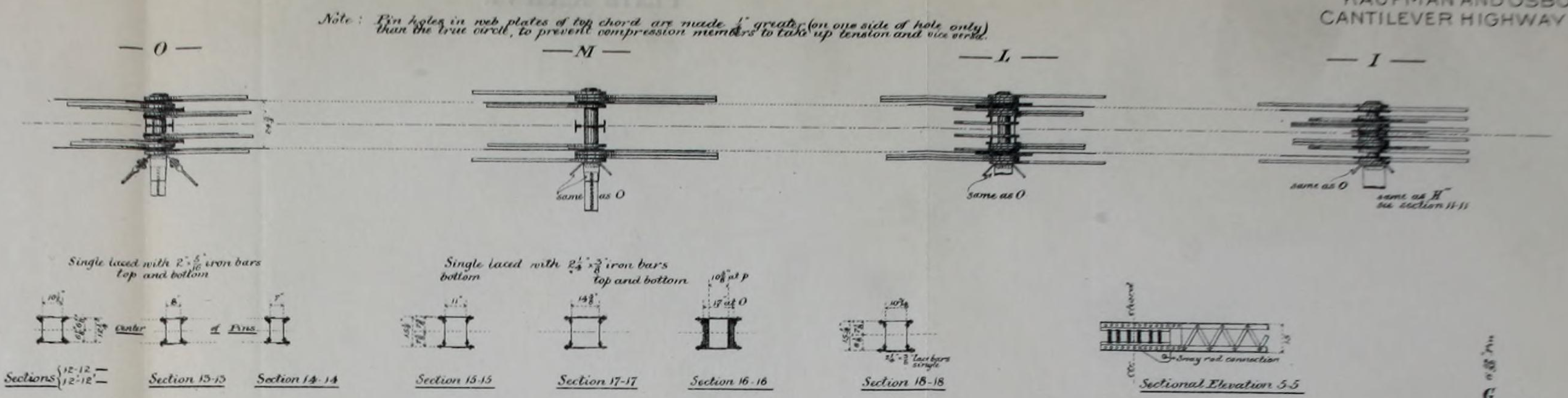
Alternate Tension and Compression

For compression only use compression formula.
For greater stress [illegible]
Use the one giving the greater area of section.

Floorbeams and Stringers

Tension (net section) [illegible]
Compression - use same gross area as tension flanges.

Note: Pin holes in web plates of top chord are made 1/16" greater (on one side of hole only) than the true circle, to prevent compression members to take up tension and vice versa.



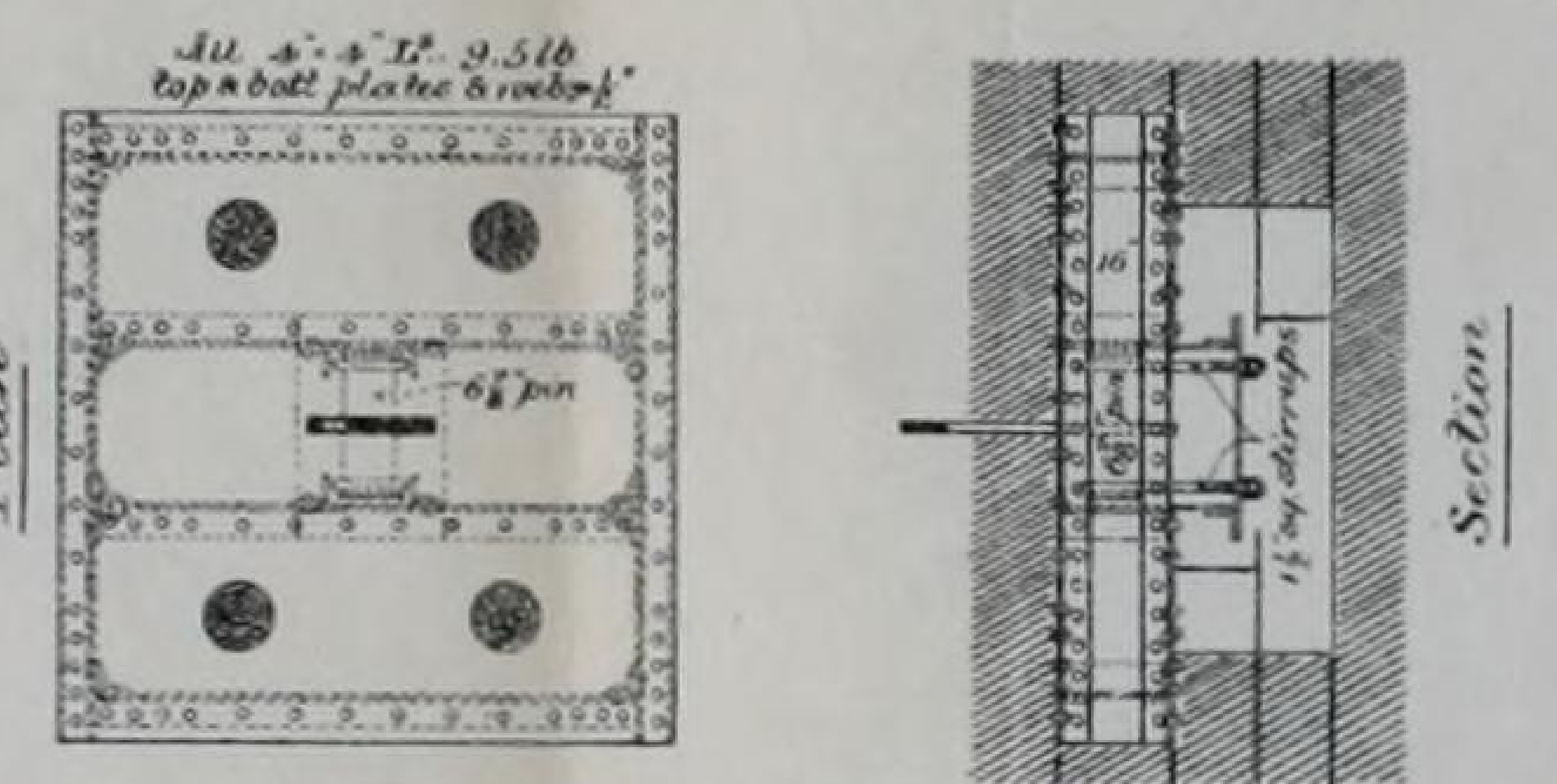
Central Bridge
betw. Cincinnati O. and Newport Ky.
Cantilever Arm

Designed by
F. C. Osborn
Chief Engr. King Br. Co.

Approved by
Ferris, Kaufman & Co.
Engineers Central Br. Co.

Sizes of material used in chords, diagonals, towers, etc.

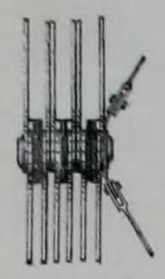
Name	Cover plates	Web plates	Top angles	Bott. angles	Eye bars	Notes
End post Qr	1 - 18"·5/16"	2 - 15"·1/2"	2-3"·3" 7.3 lb	2-3"·4"-13.7 lb		Steel
Top chord QO	None	2 - 16"·3/8"	2-3"·3"-9 ″	2-3"·3"-9 ″	2-6"·1 5/8 inside	″
″ ″ OM	″	2 - 16"·3/8"	2-3"·3" 5.9 ″	2-3"·3" 5.9 ″	2-6"·1 5/8 inside; 2-6"·1 5/8 outside	″
″ ″ ML	″	2 - 16"·3/8"	2-3"·3" 5.9 ″	2-3"·3"-5.9 ″	same as OM	″
″ ″ LI	″	2 - 16"·3/8"	2-3"·3" 5.9 ″	2-3"·3" 5.9 ″	2-6"·1 5/8 outside	″
″ ″ IG	″				2-6"·1 5/8 inside; 2-6"·1 5/8	″
Bott. ″ gi	″	2 - 22"·1/2"; 2 - 13½"·1/2"	2-4"·4" 16.6 ″	2-4"·4" 16.6 ″		″
″ ″ il	″	same as gi	″ ″ ″	″ ″ ″		″
″ ″ lm	″	2 - 22"·1/2"; 2 - 13½"·3/8"	2-4"·4" 12.5 ″	2-4"·4" 12.5 ″		″
″ ″ np	″	2 - 22"·1/2"; 2 - 13½"·3/8"	2-4"·4" 14.8 ″	2-4"·4" 14.8 ″		″
″ ″ pr	″	2 - 22"·3/8"	2-4"·4" 9.5 ″	2-4"·4" 9.5 ″		″
Diagonals GH	″	2 - 12"·5/16"	2-2½"·3" 4.4 ″	2-2½"·3" 4.4 ″		all iron
″ Hi	″	″ ″	″ ″ ″	″ ″ ″		″ ″
″ G'H, ″ H'I	1 - 21"·3/8"	2 - 16"·1/2"	2-3"·3" 8.4 ″	2-3"·4" 15.5 ″		Steel
″ iK	None	2 - 12"·5/16"	2-2½"·3" 4.4 ″	2-2½"·3" 4.4 ″		all iron
″ lM	″	2 - 12"·5/16"	2-2½"·3" 4.4 ″	2-2½"·3" 4.4 ″		″ ″
″ nO	″	2 - 15"·3/8"	2-3"·3" 6.3 ″	2-3"·4" 12 ″		Steel
″ Op	″	2 - 15"·3/8"	2-3½"·3½" 11.9 ″	2-3½"·3½" 11.9 ″		″
″ pQ	″	2 - 15"·5/16"	2-3½"·3½" 9.5 ″	2-3½"·3½" 9.5 ″		″
Tower Gg		3 - 24"·3/8"	4-3½"·6" outside (19 lb)	4-3½"·6" inside (19 lb)		″
Floorbeams	top, bott. 12"·3/8"	1 - 35¾"·3/8"	2-3"·3" 9.5 lb	2-3"·3" 9.5 lb		all iron
Intermed. Roadway Stringers	None	1 - 25¾"·5/16"	2-3"·4" 7.5 ″	2-3"·4" 7.5 ″		″ ″
Outside do	″	1 - 25¾"·5/16"	2-3"·3½" 6.5 ″	2-3"·3½" 6.5 ″		″ ″
Side walk stringers	″	1 - 21¾"·1/4"	2-2½"·3½" 5 ″	2-2½"·3½" 5 ″		″ ″



— Anchor boxes —
7 feet square filled with concrete

Scale in feet

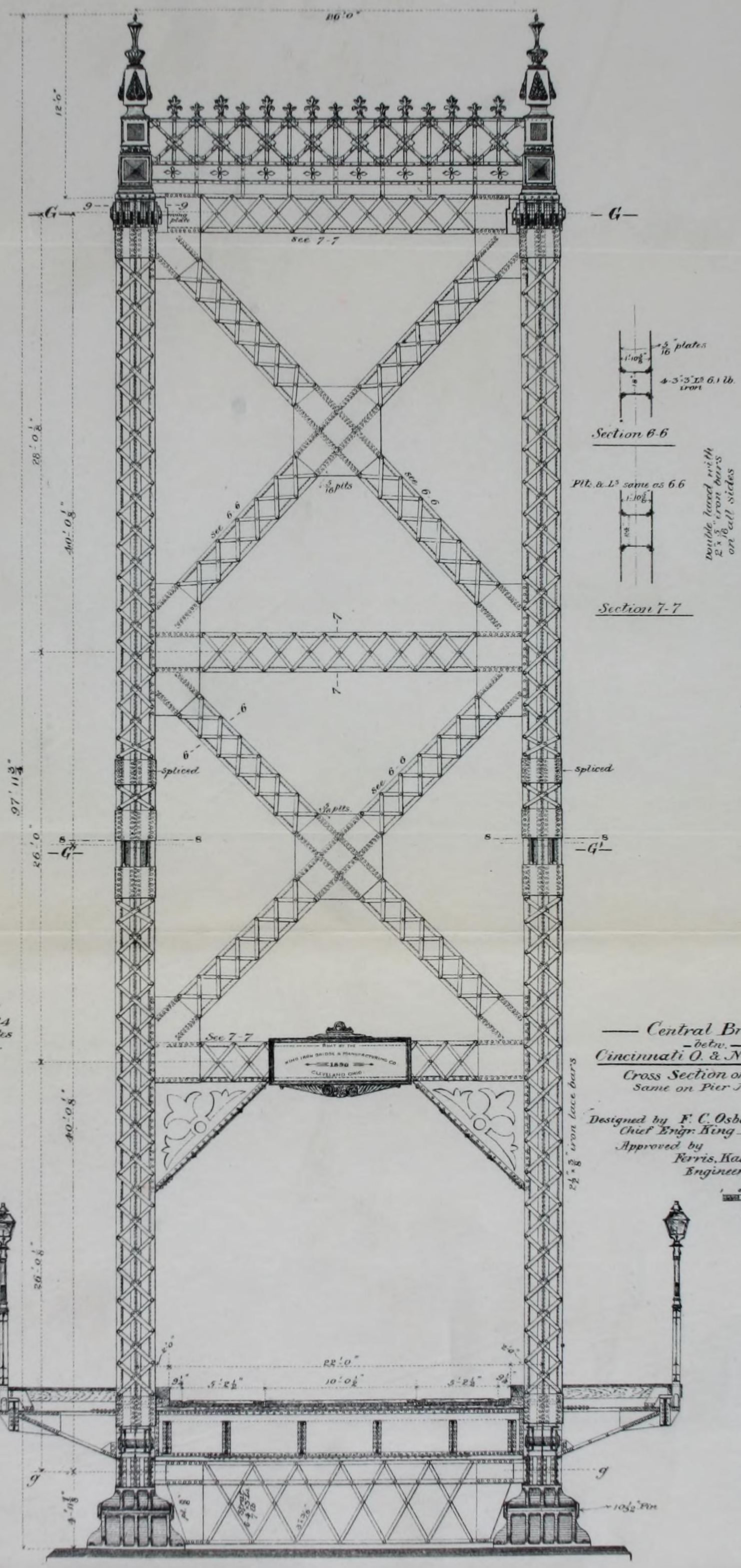
PLATE XXXVII.
TRANS. AM. SOC. CIV. ENGRS.
VOL. XXVII. No. 545.
KAUFMAN AND OSBORN ON
CANTILEVER HIGHWAY BRIDGE.



Section 9-9

Section 8-8

Note: See sheet No. 4 for sizes of plates and angles &c. for main posts



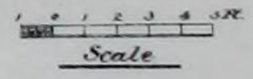
Section 6-6

Section 7-7

— Central Bridge —
— between —
Cincinnati O. & Newport Ky.

Cross Section on Pier 5
Same on Pier No. 6

Designed by F. C. Osborn
Chief Engr. King Bridge Co.
Approved by
Ferris, Kaufman & Co.
Engineers Central Br. Co.



Scale

E. Ind.

— Central Bridge —
between
Cincinnati O. & Newport Ky.

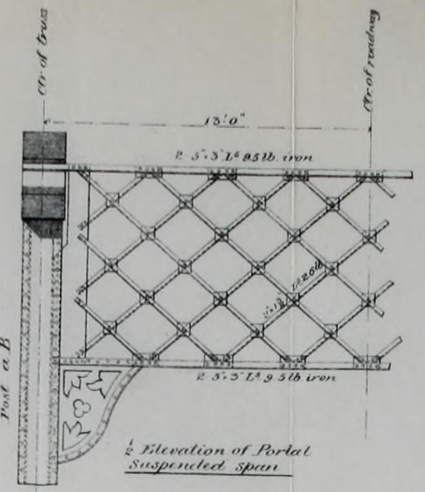
Designed by
F. C. Osborn
Chief Engr. King Br. Co.

Approved by
Ferris, Kaufman & Co.
Engineers Central Br. Co.

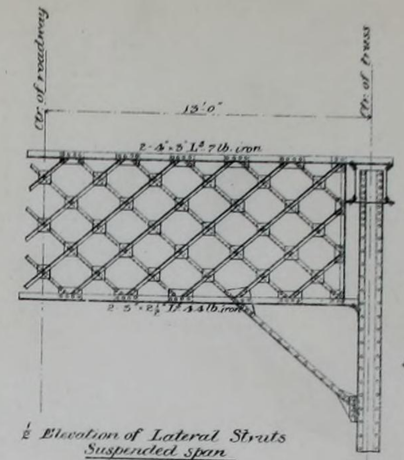
— River Arms of Suspended Span —
320'-0" c to c pins 586.

Scale of feet.

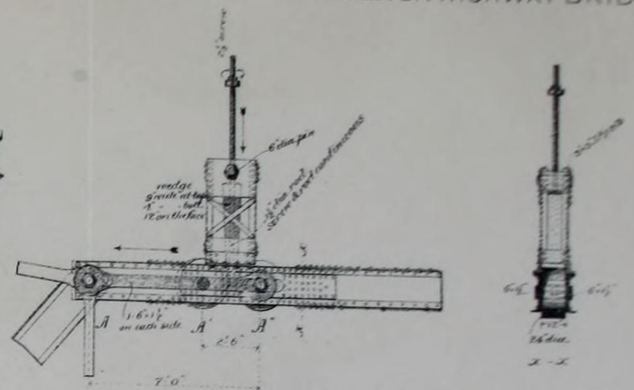
Bottom Laterals (iron) see also other sheets for connections		
gf	2 6×4 1/2 18.5 lb	River arm
fe	2 6×3 1/2 16.3 lb	" "
ed	2 6×3 1/2 14.5 lb	" "
dc	2 6×3 1/2 12.6 lb	" "
cb	2 5×3 1/2 10.9 lb	" "
ba	2 5×3 1/2 9.5 lb	" "
ab	1 5×3.5 L 13.8 lb	Suspended span
bc	1 4×3 1/2 L 11 lb	" "
cd	1 3 1/2×3 1/2 L 8.5 lb	" "
de	1 3.5×3 1/2 L 3.9 lb	" "



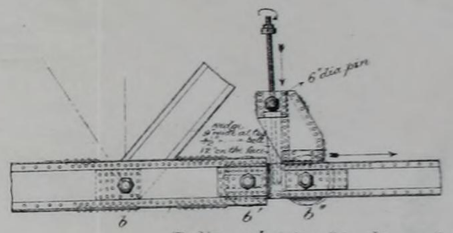
½ Elevation of Portal
Suspended span



½ Elevation of Lateral Struts
Suspended span



Top chord adjusting device.
Note. After adjustment is complete the short eye bars are taken away entirely; the pin at A is transferred to A' when a strut is inserted. Said pin also taking top lateral rods. A is provided with an expansion slot 18" long.

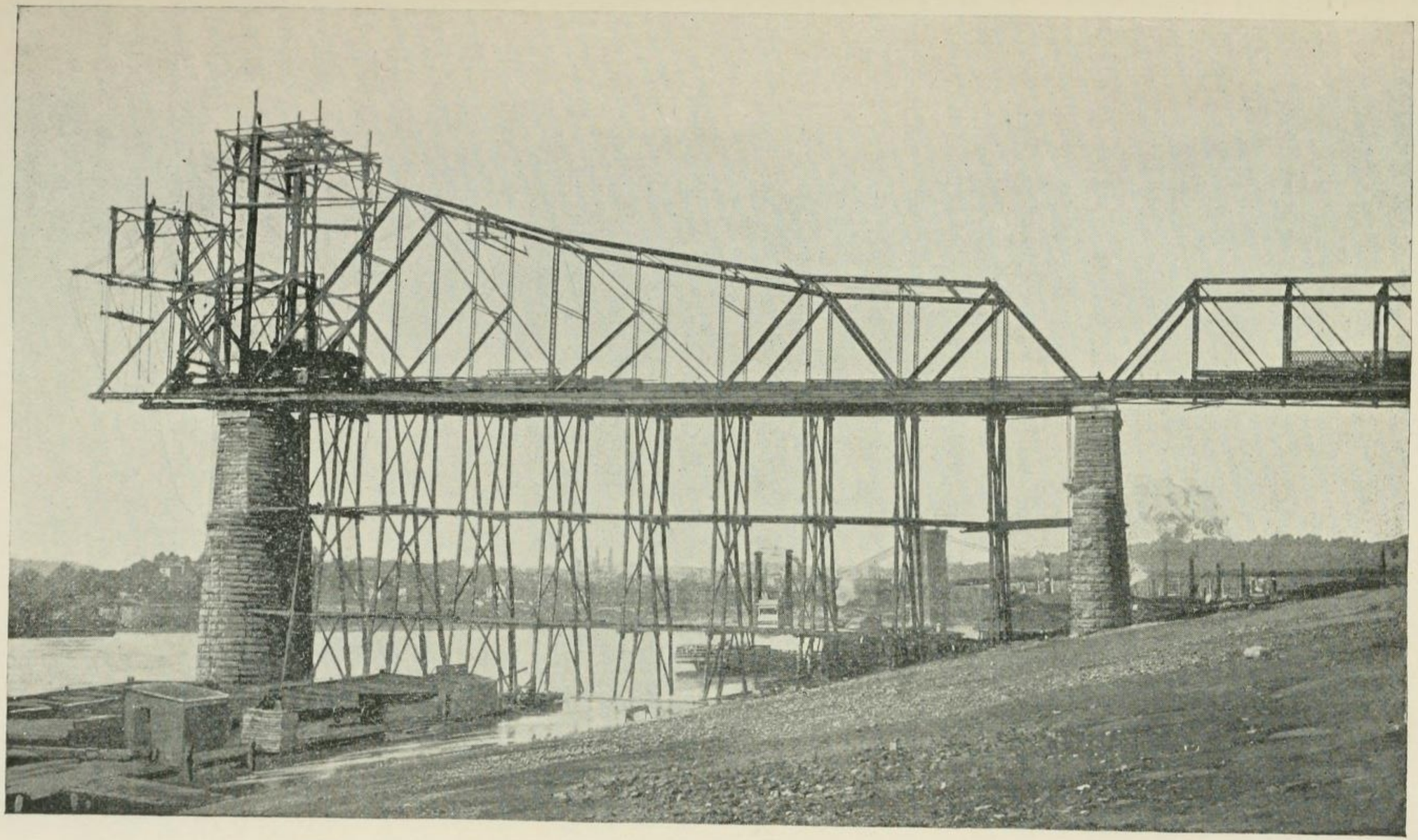


Bottom chord adjusting device.
Note. 18" expansion slot in small chord section at b'

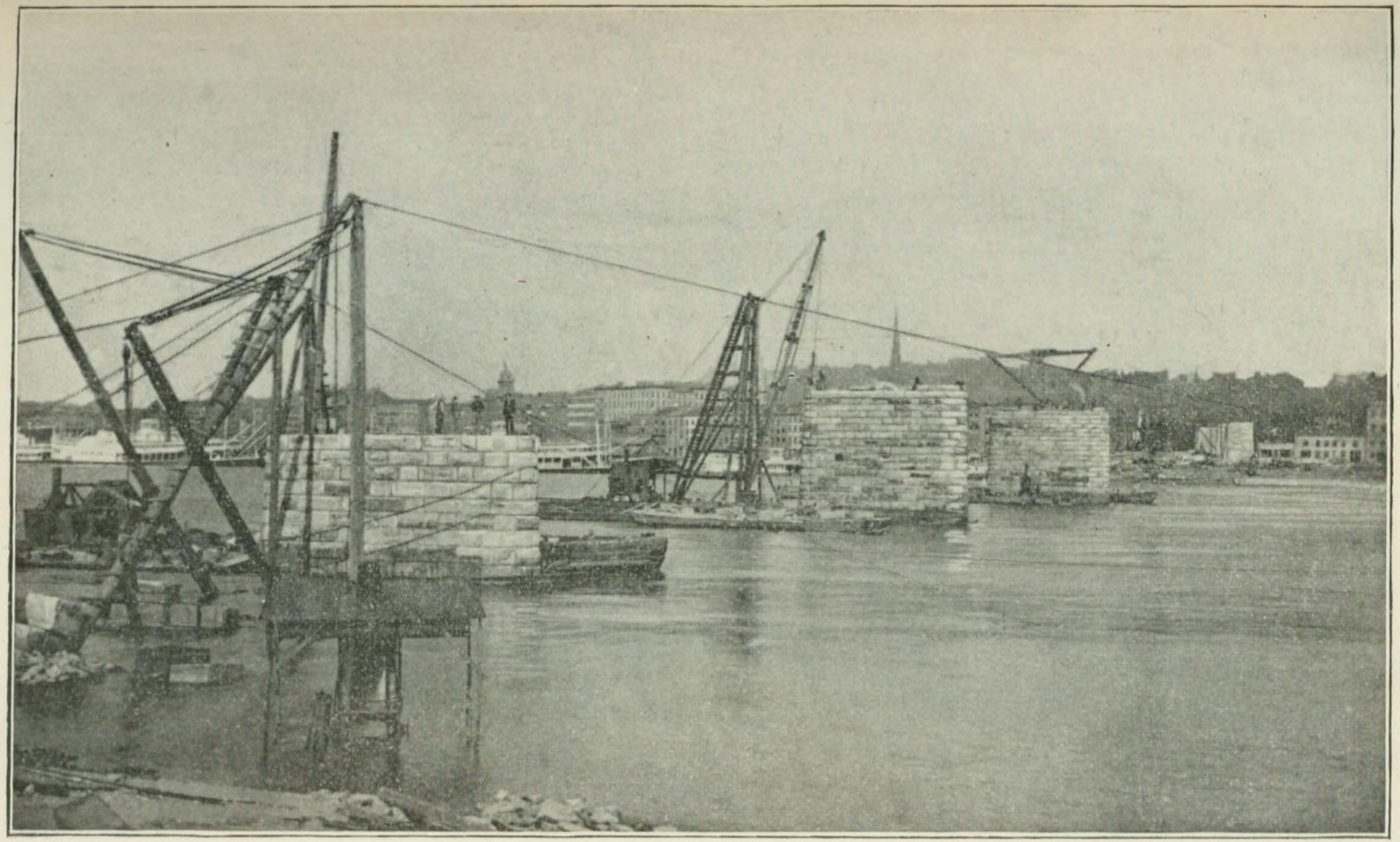
Section 1-1 gfe
Section 2-2 edc
Section 3-3 cbb'
Section 4-4 ba
Section 5-5 abc
Section 6-6 b-M
Section 7-7 aB
Section 8-8 CD
Section 9-9 BC
Section 10-10 BE

PLATE XXXIX.
TRANS.AM.SOC.CIV.ENGRS.
VOL.XXVII.No 545.
KAUFMAN AND OSBORN ON
CANTILEVER HIGHWAY BRIDGE.


Central Bridge
between
Cincinnati O. & Newport Ky.
Sections showing bents &c.
Designed by
A. H. Porter
Chief Engr King Br. Co.
Approved by
Ferris, Kaufman & Co.
Engineers Central Bridge Co.
Post supporting trolley wires
Roadway stringer
Expansion pockets
4-2½"×3" L's 4.4 lb.
1¼" sq. for all bents
Varies from 27'0" to 31'0" measured on bridge axis
Varies from 27'0" to 30'0" ctr. to ctr. bent posts
55'0" ctr. of bent to ctr. pier 9
Anchor bolts 1¼" dia.
Ground line
Longitudinal Section
Staircase opening
Bracket for stair connection and toll house platform support
Note: All lateral and longitudinal struts are laced on all four sides; 2"×5/16" and 2"×¼" bars.
Material for viaducts of iron.
22'0" ctr. to ctr. posts for all bents
Ground line
Scale of Feet
Cross Section

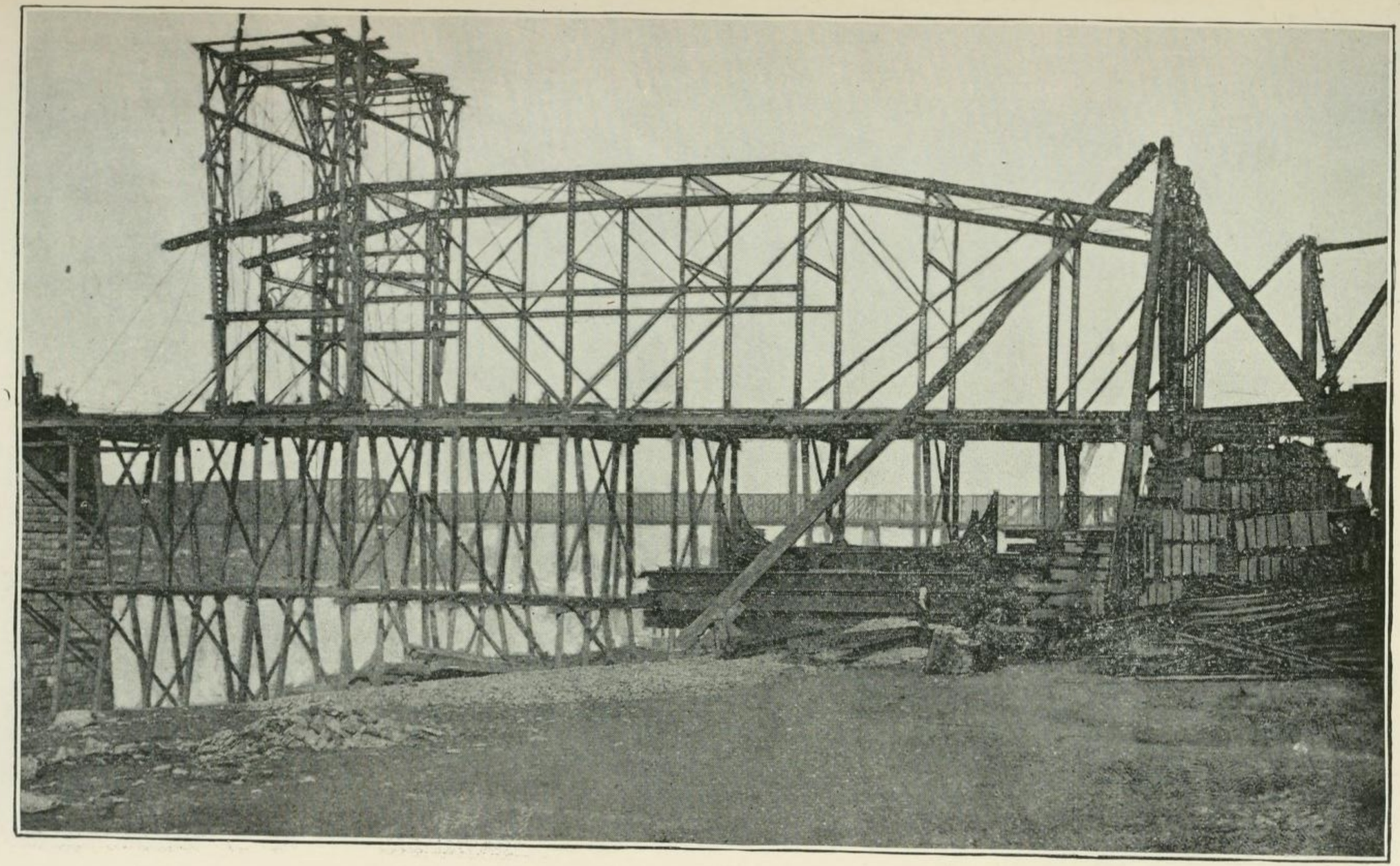


ANCHORAGE ARM OF CANTILEVER ON CINCINNATI SIDE, JULY 14TH, 1891.



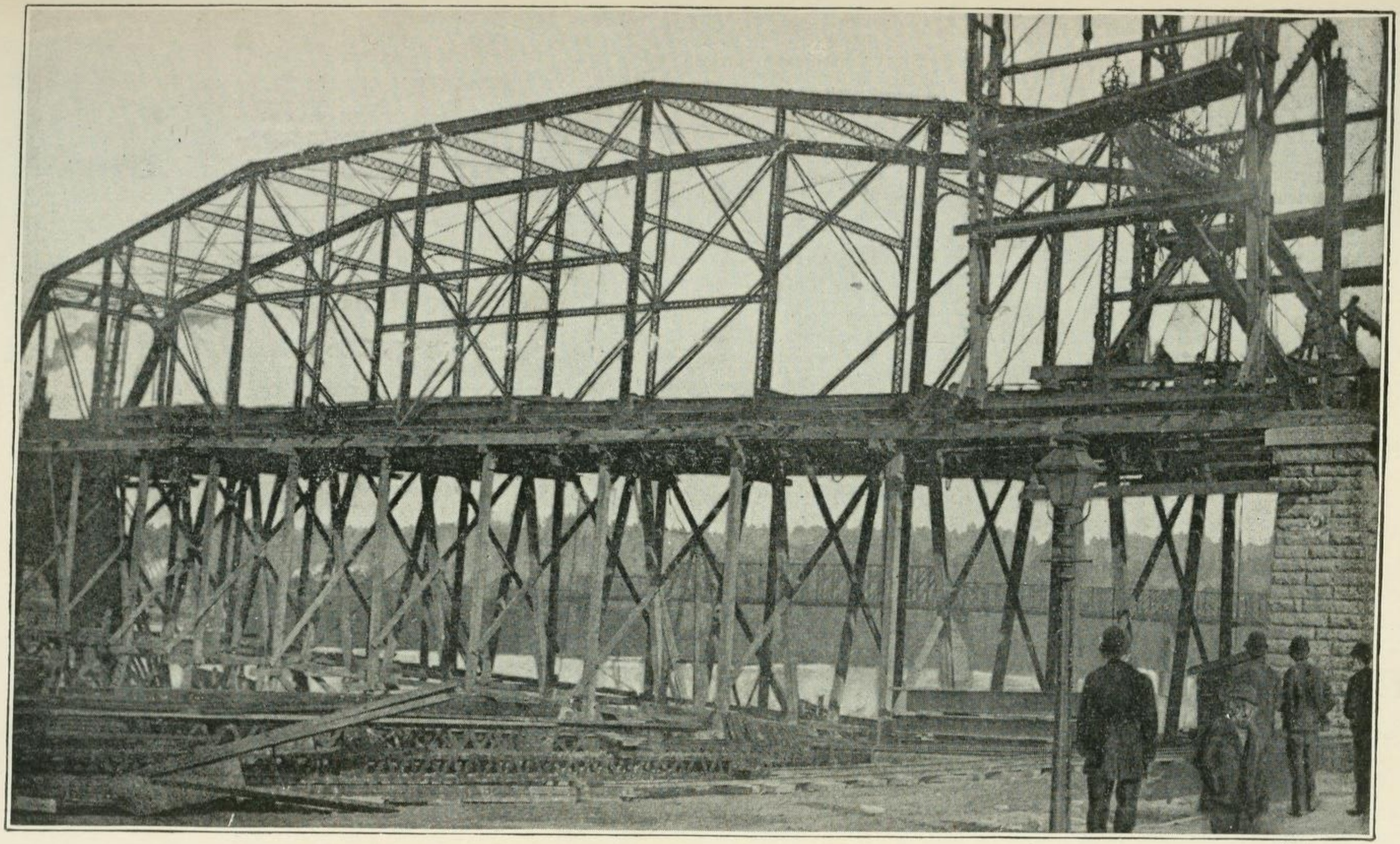
GENERAL VIEW OF RIVER PIERS, SEPTEMBER 20TH, 1890.

PLATE XL.
TRANS. AM. SOC. CIV. ENGS.
VOL. XXVII, No. 545.
KAUFMAN & OSBORN ON CANTILEVER
HIGHWAY BRIDGE.



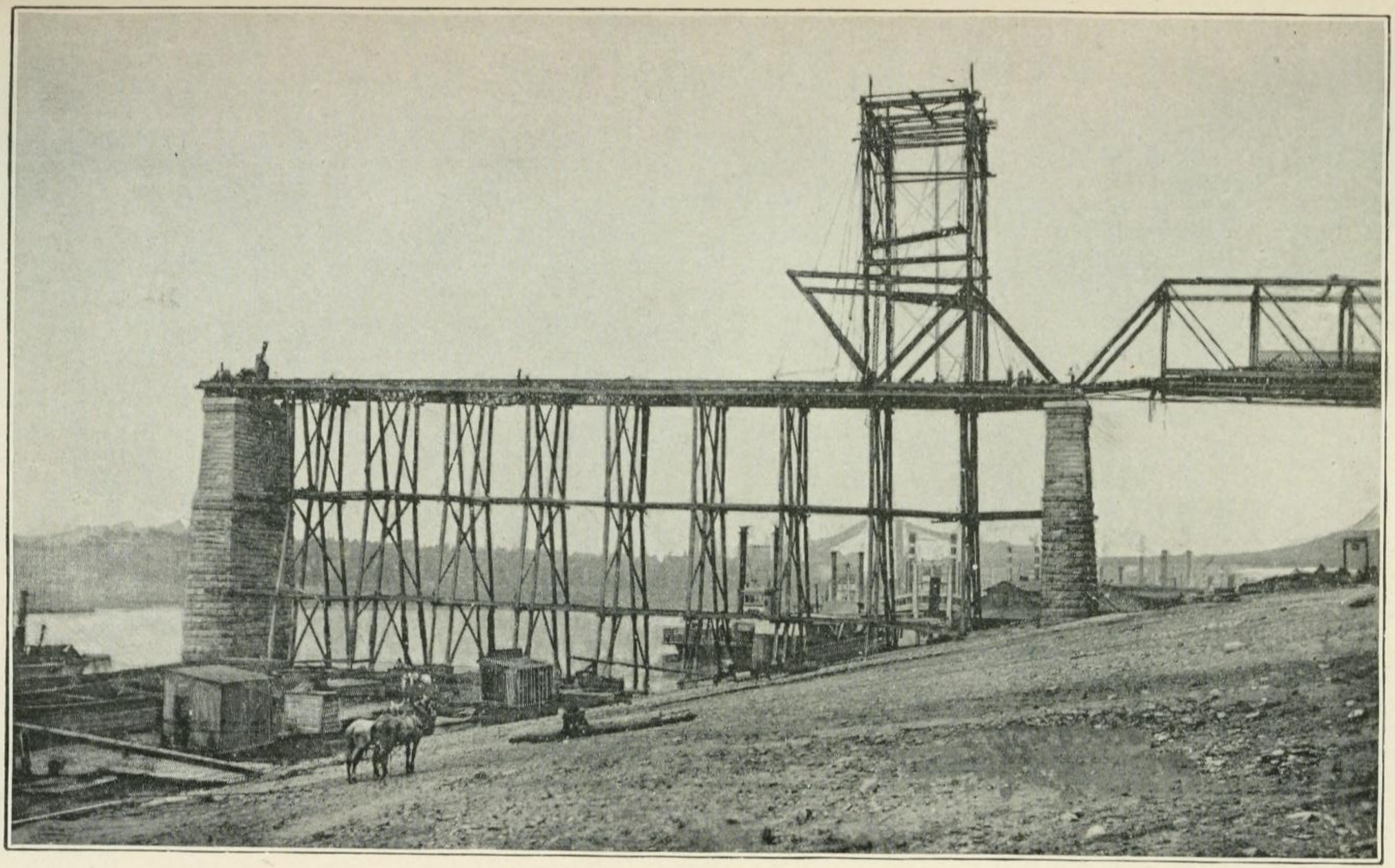
SPAN 8 AND 9, NEWPORT SIDE, NOVEMBER 14TH, 1890.

PLATE XLI.
TRANS. AM. SOC. CIV. ENGS.
VOL. XXVII, No. 545.
KAUFMAN & OSBORN ON CANTILEVER
HIGHWAY BRIDGE.



SPAN 8 AND 9, NEWPORT SIDE, NOVEMBER 17TH, 1890.

PLATE XLII.
TRANS. AM. SOC. CIV. ENGS.
VOL. XXVII, No. 545.
KAUFMAN & OSBORN ON CANTILEVER HIGHWAY BRIDGE.



ANCHORAGE ARM OF CANTILEVER, CINCINNATI SIDE, JUNE 30TH, 1891.

PLATE XLIII.
TRANS. AM. SOC. CIV. ENGS.
VOL. XXVII, No. 545.
KAUFMAN & OSBORN ON CANTILEVER
HIGHWAY BRIDGE.